SECTION 08630

METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Aluminum-framed skylights with retaining caps.

B. Related Sections:
   1. Division 7 Section "Building Insulation" for insulation installed with metal-framed skylights.
   2. Division 7 Section "Joint Sealants" for sealants installed at metal-framed skylight perimeters.
   3. Division 8 Section "Glazing" for glass units installed in metal-framed skylights.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide metal-framed skylights capable of withstanding loads and thermal and structural movements indicated without failure. Failure includes the following:
   1. Deflection exceeding specified limits.
   2. Thermal stresses transferred to the building structure.
   3. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing.
   4. Noise or vibration created by thermal and structural movement and wind.
   5. Loosening or weakening of fasteners, attachments, and other components.
   6. Sealant failure.

B. Deflection Limits: As follows:
   1. Deflection of the entire length of framing members in direction normal to glazing plane is limited to 1/180 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
   2. Deflection of the entire length of framing members for spans exceeding 20 feet is limited to 1/240 of clear span.
   3. Deflection of framing members in a direction parallel to glazing plane, when carrying full dead load, is limited to an amount not exceeding that which reduces glazing bite below 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.

C. Lateral Support: Compression flanges of flexural members are laterally braced by cross members with minimum depths equal to 50 percent of flexural member depth and by anchors to the building structure. Glazing material does not provide lateral support.

D. Structural Loads: Provide metal-framed skylights, including anchorage, capable of withstanding the effects of the design loads when supporting full dead loads:
   1. Design Loads: Refer to Structural Drawings for design loads.
   2. Concentrated Load: 250 lbf applied to framing members at location that produces the most severe stress or deflection.
   3. Structural Performance: Provide metal-framed skylights, including anchorage, capable of withstanding test pressure indicated without material and deflection failures and permanent deformation of structural members exceeding 0.2 percent of span when tested according to ASTM E 330.
   4. Test Pressure: 150 percent of positive and negative wind-load design pressures.

5. Test Duration: As required by design wind velocity; fastest 1 mile of wind for relevant exposure category.

E. Thermal Movement: Provide metal-framed skylights that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, sealant failure, and other detrimental effects.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.

F. Air Infiltration: Provide metal-framed skylights with maximum air leakage of 0.06 cfm/sq. ft. of surface when tested according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft..

G. Water Penetration: Provide metal-framed skylights that do not evidence water penetration when tested according to ASTM E 331 at a minimum differential static pressure of 20 percent of positive design wind load, but not less than 6.24 lbf/sq. ft..

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions and profiles of components, and finishes for metal-framed skylights.

B. Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, and attachments to other Work.
1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Samples for Verification: For each exposed aluminum finish required, prepared on 12-inch-long sections of extrusions or formed shapes in same thickness and material indicated for the Work. If finishes involve normal color variations, include sample sets consisting of two or more units showing the full range of variations expected.

D. Installer Certificates: Signed by manufacturer certifying that installers comply with requirements.

E. Preconstruction Test Reports: Indicate and interpret test results for compliance with requirements.

F. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with sealants; include sealant manufacturer's interpretation of test results for sealant performance and recommendations for primers and substrate preparation needed for adhesion.

G. Field Test Reports: Indicate and interpret test results for compliance with requirements.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer to assume engineering responsibility who has specialized in installing metal-framed skylights similar to those indicated for this Project and who is acceptable to manufacturer.
1. Engineering Responsibility: Preparation of Shop Drawings, testing program development, test result interpretation, and comprehensive engineering analysis by a qualified professional engineer.

B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of metal-framed skylights. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, one another, and adjoining construction. Performance

characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Preconstruction Testing: As follows:
   1. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing indicated.
   2. Test metal-framed skylights for compliance with performance requirements according to specified test methods. Conduct tests using specimen representative of proposed materials and construction including perimeter components, corners, splice joints, sealants, and anchors according to AAMA 501 recommendations adapted to skylights.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

E. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to sealant manufacturer, for testing indicated below, samples of materials that will contact or affect joint sealants.
   1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
      a. Perform tests under environmental conditions replicating those that will exist during installation.
   2. Submit not fewer than nine pieces of each type of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

F. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in General and Supplementary Conditions section "Project Meetings."

1.6 PROJECT CONDITIONS

A. Field Measurements: Where metal-framed skylights are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
   1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating skylights without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of metal-framed skylights that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
   1. Structural failures.
   2. Sealant failures.
   3. Failure of systems to meet performance requirements.
   4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

5. Water leakage; defined as uncontrolled water appearing on normally exposed interior surfaces of skylights from sources other than condensation. Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water leakage.
6. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the above manufacturer or approved equal by one of the following:
1. Imperial Glass Structures.
2. Naturalite/EPI Skylight Systems.
3. Linell
4. O'Keeffe's Inc.
5. Skyline Products, Inc.
6. Super Sky Products, Inc.
7. Tri-Star Skylights

2.2 FRAMING MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for use and finish indicated, and as follows:
1. Extrusions: ASTM B 221.
2. Sheet and Plate: ASTM B 209.
3. Bars, Rods, and Wire: ASTM B 211.

B. Brackets and Reinforcements: Provide manufacturer's standard high-strength aluminum brackets and reinforcements. Provide nonstaining, nonferrous shims to install and align skylights.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing; compatible with adjacent materials.

D. Exposed Flashing and Closures: Aluminum sheet.
1. Minimum Thickness: 0.060 inch.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories; compatible with adjacent materials.
1. Movement Joints: Provide slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
2. Aluminum-Retaining-Cap Fasteners: ASTM A 193/A 193M, Series 300 stainless-steel screws; type as recommended by manufacturer.
3. Connections to Supporting Structure: ASTM A 307, zinc-coated steel fasteners.
4. Anchor Bolts: ASTM A 307, Grade A, zinc-coated steel anchor bolts.
5. Concrete or Masonry Inserts: Zinc-coated cast-iron, malleable-iron, or steel inserts; hot-dip galvanized according to ASTM A 123.

F. Framing-System Sealants: Compatible with components with which sealants come in contact and recommended by skylight and sealant manufacturers for this use.

G. Bituminous Paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no asbestos, and formulated for 30-mil thickness per coat.

H. Thermal Insulation: As specified in Division 7 Section "Building Insulation."

2.3 GLAZING MATERIALS

A. Glass: As specified in Division 8 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard pressure-glazing gaskets of elastomer type and hardness selected by skylight and gasket manufacturers to comply with requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

C. Spacers, Edge Blocks, and Setting Blocks: Manufacturer's standard permanent nonmigrating type of elastomer type and hardness selected to comply with requirements.

D. Weatherseal Sealant: Neutral-curing silicone sealant recommended by skylight and sealant manufacturers for this use.
   1. Sealant is capable of withstanding 50 percent movement in both extension and compression (total of 100 percent movement) when tested for adhesion and cohesion under maximum cyclic movement according to ASTM C 719.
   2. Sealant complies with ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and, as applicable to substrates including other sealants with which it comes in contact, O.
   3. Color: Black.

2.4 FABRICATION

A. Framing Components: As follows:
   1. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
   2. Fabricate components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior.
   3. Fabricate components to accommodate expansion, contraction, and field adjustment, and to provide for minimum clearance and shimming at skylight perimeter.
   4. Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
   5. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
   6. Fit and assemble components to greatest extent practicable before finishing.
   7. Fit and secure joints with screw and spline, internal reinforcement, or welding.
   8. Reinforce members as required to retain fastener threads.
   9. Where fasteners are exposed to view from interior, countersink bolt or screw heads and finish to match framing.
   10. Weld components before finishing and in concealed locations to greatest extent practicable to minimize distortion.
   11. Before shipping, shop assemble, mark, and disassemble components that cannot be permanently shop assembled.

B. Thermally Improved Construction: Fabricate aluminum framing with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
   1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.

C. Provide continuous aluminum curb with weatherproof expansion joints and locked and sealed or fully welded corners. Locate weep holes in the curb at each rafter connection to drain condensation.

D. Prepare framing to receive anchor and connection devices and fasteners.

E. Metal Protection: As follows:
   1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
   2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

2.5 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

C. Superior-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
a. Color and Gloss: Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting skylight performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Furnish anchor bolts and inserts for setting in concrete formwork or masonry indicated to support skylights.

B. Metal Protection: As follows:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
3. Where aluminum will contact pressure-treated wood, separate dissimilar materials by methods recommended by manufacturer.

3.3 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing skylight components.
1. Fit frame joints to produce hairline joints free of burrs and distortion.
2. Rigidly secure nonmovement joints.
3. Accommodate thermal and mechanical movements.
4. Install framing components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior.
5. Coordinate installation of insulation and flashings at skylight perimeters to maintain continuity of thermal and water barriers.
6. Set continuous curbs and flashings in a full sealant bed, unless otherwise indicated. Comply with requirements in Division 7 Section "Joint Sealants."

B. Erection Tolerances: Install skylight components true in plane, accurately aligned, and without warp or rack. Adjust framing to comply with the following tolerances:

1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 10 feet; 1/4 inch over total length.
2. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 3 inches, limit offset from true alignment to less than 1/32 inch; otherwise, limit offset from true alignment to 1/8 inch.

C. Field Glazing: As follows:
1. Insulating Laminated Glass: Comply with requirements in Division 8 Section "Glazing."

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field quality-control tests and to prepare test reports.

B. Water-Spray Test: Test skylights for compliance with requirements according to procedures in AAMA 501.2.

C. Repair or replace Work that does not meet requirements or that is damaged by testing; repair or replace to comply with specifications.

3.5 CLEANING

A. Clean skylights inside and outside, immediately after installation and after sealants have cured, according to manufacturer's written recommendations.
1. Remove temporary protective coverings and strippable coatings from prefinished metal surfaces. Remove labels and markings from all components.

B. Remove excess sealant according to sealant manufacturer's written recommendations.

END OF SECTION 08630